ABSTRACTS
MOLLUSCAN NERVOUS SYSTEMS AND BEHAVIOR SYMPOSIUM

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BEHAVIOR OF GASTROPOD MOLLUSCS. T. E. Audesirk, University of Colorado at Denver.

A brief overview of research in several areas of gastropod behavior was presented, with emphasis on behaviors that lend themselves to analysis at the neuronal level. Gastropods have proven excellent subjects for neuroethology. Their brains are relatively simple, and many have extremely large, brightly pigmented neurons that can be identified as individuals from one preparation to the next. Gastropod behavior tends to be simple and stereotyped, and often consists of rhythmically repeated movements, such as in swimming, crawling, or feeding. General areas of behavior with special applicability to neuroethological research include visually and chemically mediated behavior, locomotion, feeding, and learning.

Research by investigators in each of these areas was described. The general topics covered included the use of visual cues by the marsh periwinkle *Littorina irrorata* to locate stems of marsh grass, and the use of celestial cues to maintain a constant swimming orientation in the opisthobranch *Aplysia brasiliana*. The role of the chemoreceptive structures in both *Aplysia californica* and the terrestrial pulmonate *Achatina fulica* was described. Locomotion in *Aplysia californica* by pedal waves and in the nudibranch *Tritonia* by swimming was reviewed. Feeding behavior in *Tritonia* was also covered.

The neural basis of learning is one of the significant problems of neurobiology and the use of gastropods, especially *Aplysia*, has led to significant contributions in this field. A procedure for classically conditioning the freshwater pulmonate *Lymnaea stagnalis* was described. *Lymnaea* learn to make feeding movements to a non-food odor after it has been paired with food only once, and retain the memory for nearly three weeks.

IDENTIFIABLE NERVE CELLS IN GASTROPOD NEUROBIOLOGY. Gerald Audesirk, Department of Biology, University of Colorado at Denver.

All nerve cells, both in invertebrates and vertebrates, share many fundamental physiological similarities. Nevertheless, individual nerve cells possess unique "personalities" conferred by their morphology, biochemistry, and membrane properties. Nervous systems are therefore not computer-like, in which numerous identical units are connected in complex ways to produce different outputs, but are constellations of more-or-less unique individuals. Behavioral outputs are produced not only by the pattern of interconnection among cells but also by the "personalities" of the individual cells.

The uniqueness of individual nerve cells is most easily seen and utilized in the gastropod brain. Many nerve cells are identifiable by the neurobiologist as unique individuals, on the basis of size, color, position in the brain, axonal morphology, and physiology. In seeking to understand the neural control of a behavior, gastropods offer the potential for determining the exact neurons which influence the behavior, what their role is, and returning for further study to the same neurons in every animal of a given species.

Examples of the use of identified neurons in studying the neural control of behavior include the control of locomotion and plasticity in the decision to feed in the nudibranch *Tritonia diomedea*. Single, identified neurons, one located in each pedal ganglion, have been found to drive cilia on the foot by which *Tritonia* crawls. These neurons send their axons to the foot, where they release the transmitter serotonin, which excites ciliary beating. Another group of neurons in the cerebral ganglia are receptors for food. During escape from predatory starfish, *Tritonia* ignore food stimuli, a process apparently mediated by changes in the responsiveness of these receptors.

***LIMAX* LOGIC: BEHAVIORAL AND NEUROPHYSIOLOGICAL STUDIES OF THE CAPABILITIES OF THE *LIMAX* NERVOUS SYSTEM. Steven J. Wieland,** Department of Biology, Princeton University, New Jersey.

Behavioral experiments have demonstrated higher-order learning processes in the feeding behavior of *Limax maximus*. Neurophysiological studies have revealed the learning ability of the isolated nervous system, and the roles of several transmitters within the feeding network.

A MOLLUSCAN NEUROPEPTIDE ACTS AT MULTIPLE SITES TO MODULATE FEEDING BEHAVIOR IN GASTROPODS. Philip Lloyd, Columbia Medical School, New York, New York.

A neuropeptide (SCP sub-B) recently sequenced from *Aplysia* central nervous system, and neurons which contain this peptide, act centrally to enhance neuronal output from the buccal ganglia, and peripherally to enhance contractile activity of the gut and muscles of the buccal mass.